Name: _____ **Class:** _____ **Date:** _____ **ID: A**

AP Physics 2 - Chapter 19 Practice

Multiple Choice
Identify the choice that best completes the statement or answers the question.

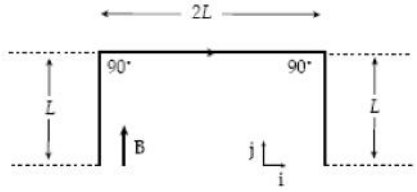
____ 1. An electron moving in the positive x direction experiences a magnetic force in the positive z direction. If $B_x = 0$, what is the direction of the magnetic field?
a. negative y direction c. negative z direction e. negative x direction
b. positive y direction d. positive z direction

____ 2. A positively charged particle has a velocity in the negative z direction at point P. The magnetic force on the particle at this point is in the negative y direction. Which one of the following statements about the magnetic field at point P can be determined from this data?
a. B_x is positive. c. B_y is negative. e. B_x is negative.
b. B_z is positive. d. B_y is positive.

____ 3. A charged particle (mass = M, charge = $Q > 0$) moves in a region of space where the magnetic field has a constant magnitude of B and a downward direction. What is the magnetic force on the particle at an instant when it is moving horizontally toward the north with speed V?
a. QVB toward the east c. QVB toward the west e. QVB toward the south
b. Zero d. QVB upward

____ 4. A segment of wire carries a current of 25 A along the x axis from $x = –2.0$ m to $x = 0$ and then along the z axis from $z = 0$ to $z = 3.0$m. In this region of space, the magnetic field is equal to 40 mT in the positive z direction. What is the magnitude of the force on this segment of wire?
a. 1.0 N b. 5.0 N c. 2.0 N d. 3.6 N e. 3.0 N

____ 5. A straight wire is bent into the shape shown. Determine the net magnetic force on the wire when the current I travels in the direction shown in the magnetic field $\vec{\mathbf{B}}$.



a. 2IBL in the –z direction c. 4IBL in the +z direction e. zero
b. 2IBL in the +z direction d. 4IBL in the –z direction

____ 6. A wire (mass = 50 g, length = 40 cm) is suspended horizontally by two vertical wires which conduct a current I = 8.0 A, as shown in the figure. The magnetic field in the region is into the paper and has a magnitude of 60 mT. What is the tension in either wire?

a. 0.15 N b. 0.68 N c. 0.30 N d. 0.34 N e. 0.10 N

____ 7. A rectangular coil (0.20 m × 0.80 m) has 200 turns and is in a uniform magnetic field of 0.30 T. When the orientation of the coil is varied through all possible positions, the maximum torque on the coil by magnetic forces is 0.080 N · m. What is the current in the coil?
a. 5.0 mA b. 1.7 A c. 8.3 mA d. 1.0 A e. 42 mA

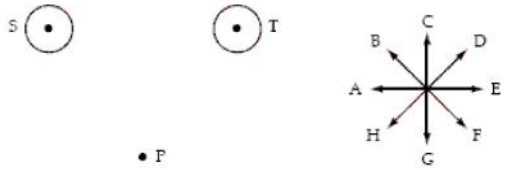
____ 8. An electron follows a circular path (radius = 15 cm) in a uniform magnetic field (magnitude = 3.0 G). What is the period of this motion?
a. 0.12 «s b. 1.2 ms c. 0.18 «s d. 1.8 ms e. 1.8 «s

____ 9. A proton is accelerated from rest through a potential difference of 150 V. It then enters a region of uniform magnetic field and moves in a circular path (radius = 12 cm). What is the magnitude of the magnetic field?
a. 18 mT b. 12 mT c. 15 mT d. 22 mT e. 10 mT

____ 10. A proton is accelerated from rest through a potential difference of 2.5 kV and then moves perpendicularly through a uniform 0.60-T magnetic field. What is the radius of the resulting path?
a. 15 mm b. 12 mm c. 18 mm d. 24 mm e. 8.5 mm

____ 11. One reason why we know that magnetic fields are not the same as electric fields is because the force exerted on a charge $+q$
a. is in opposite directions in electric and magnetic fields.
b. is in the same direction in electric and magnetic fields.
c. is parallel to a magnetic field and perpendicular to an electric field.
d. is parallel to an electric field and perpendicular to a magnetic field.
e. is zero in both if the charge is not moving.

____ 12. The point P lies along the perpendicular bisector of the line connecting two long straight wires S and T perpendicular to the page. A set of directions A through H is shown next to the diagram. When the two equal currents in the wires are directed up out of the page, the direction of the magnetic field at P is closest to the direction of



a. E. b. F. c. G. d. H. e. A.

____ 13. A charged particle (mass = M, charge = $Q > 0$) moves in a region of space where the magnetic field has a constant magnitude of B and a downward direction. What is the magnetic force on the particle at an instant when it is moving horizontally toward the north with a speed V?
a. QVB toward the east c. QVB toward the west e. QVB toward the south
b. Zero d. QVB upward

____ 14. When the number of turns in a solenoid and its length are both doubled, the ratio of the magnitude of the new magnetic field inside to the magnitude of the original magnetic field inside is:
a. 0.25 b. 0.50 c. 1 d. 2 e. 4

____ 15. A 0.50-m long solenoid consists of 1 000 turns of copper wire wound with a 4.0 cm radius. When the current in the solenoid is 18 A, the magnetic field at a point 1.0 cm from the central axis of the solenoid is
a. 0.090 mT. b. 0.36 mT. c. 23 mT. d. 36 mT. e. 45 mT.

Problem

16. Two wires, each having a weight per unit length of 1.0×10^{-4} N/m, are strung parallel, one 0.10 m above the other. If the wires carry the same current, though in opposite directions, how great must the current in each wire be for the magnetic field of the lower conductor to balance the weight of the upper conductor?

17. What current in a solenoid 15.0-cm long wound with 100 turns would produce a magnetic field equal to that of the Earth, 5.00×10^{-5} T?

AP Physics 2 - Chapter 19 Practice
Answer Section

MULTIPLE CHOICE

1. A
2. A
3. C
4. C
5. B
6. D
7. C
8. A
9. C
10. B
11. D
12. A
13. C
14. C
15. E

PROBLEM

16. 7.1 A
17. 59.7 mA